

I CLAIM:

1. A binding machine for spirally binding a sheaf of papers into a book comprising:

5 a. means for clamping together the sheaf of papers making up said book, said book having a plurality of holes in a row adjacent one edge of said book to receive the leading edge of said spiral bonding element;

b. a stationary base spaced from one end of said book;

10 c. a block slidably mounted on said base having an arm extending outwardly and supporting at its distal and thereof a cylindrically shaped mandrel spaced from said slidable block and the bottom edge of said mandrel horizontally in a line with said row of holes in said book, said arm being attached at its distal end to said mandrel at the proximate end of said mandrel facing said row of holes and spaced from said book and said arm attached to said block at the proximate end with means for adjusting the distance between said mandrel and said block;

20 d. conveyor means for feeding onto said mandrel from the distal end thereof a plastic pre-formed, spiral binding element terminating at the proximate end of said mandrel with the leading edge of said binding element facing and spaced from said book, the internal diameter of said spiral binding element being slightly in excess of the outer diameter of said mandrel;

25 e. spring means mounted on said slidable block for engaging and biasing adjustably said spiral binding element on said

mandrel upwardly against said mandrel so that the upper portion of said binding element is spaced from the top of said mandrel;

f. means comprising a wheel having an outer frictional surface for engaging a top outer surface of said spiral binding element and motor means for driving said wheel to feed said spiral binding element into said row of holes in said book for binding same; and

g. means for adjusting the position of said block on said base for positioning said mandrel to obtain proper alignment of the leading edge of said spiral binding element with said row of holes.

2. The binding machine of claim 1 having means for cutting said spiral binding element wound on said book at both ends of said book and bending both ends of said binding element on said book.

3. The binding machine of claim 2 having optical sensing means for signaling that the leading edge of said spiral has been reached.

4. The binding machine of claim 3 having pneumatically driven means for positioning said wheel for contact with said spiral binding element including hydraulic shock absorbing means for mediating the speed of engagement of said wheel with said spiral binding element.

5. The binding machine of claim 4 in which said cutting means comprises a pair of spaced cutting members, a rotatable arm for engaging said cutting members and actuating the cutting and bending action when rotated in one direction, means biasing said rotatable arm in the second direction, and means for pneumatically causing the rotation of said rotatable arm in the first direction overcoming said biasing means to cut and bend in unison.

6. The binding machine of claim 5 having a control panel for sequencing the steps of binding said book and indicating visually when said cutting and bending of ends is completed so that the binding action can be repeated for the next book.

7. The binding machine as in claim 1 further comprising a means for significantly spreading apart each coil of said spiral binding element for initial insertion into respective first and last holes of a row of holes, said means comprising two leading hole spreader members insertable within said respective coils of said spiral binding wherein at a point before the spiral enters the leading hole of a sheaf to be bound, said leading hole spreader members being disposed adjacent to said leading hole and wherein another a trailing hole spreader member is located adjacent to said final hole, wherein a predetermined space between each said coil is widened by contact of a binding edge of

each said spreader member around each said coil.

8. The binding machine as in claim 7 having a comb clamp having a pair of opposing elongated jaws with alternating
5 projections and recesses therebetween,

one of said jaws being a fixed jaw horizontally disposed along and attached to the longitudinal frame of said binding machine and the other of said jaws being a movable jaw hinged to said longitudinal frame of said binding machine so as to be
10 movable between a closed position in close proximity to said fixed jaw for clamping said sheaf in place with holes in alignment with said recesses of said elongated jaws in preparation for accepting said spiral coil; and wherein

said leading hole spreader members are oppositely disposed respectively on said opposing fixed and movable jaws of said comb clamp;

said spreader disposed on said fixed jaw comprising a flat base having a slot therein and a slim extension projecting therefrom, said slim extension having a contact end for
20 contacting and spreading said coil, said contact end being rounded and tapered; and wherein

said spreader disposed on said movable jaw comprising a flat base having a slot and an aperture therein and an extension projecting therefrom, said extension having a guidance groove
25 therein for accepting and guiding said spiral coil as said coil travels longitudinally during the process of entering and binding

successive holes of said sheaf to be bound;

said extensions and for contacting and spreading said spiral coil at a point before the leading edge of said coil enters the leading hole of said sheaf to be bound;

5 said extensions and being disposed adjacent to each other when said comb clamp is in its closed position; and wherein

said trailing hole spreader comprises a base having an oblique contour blade member extending therefrom, said oblique contour blade member engagable with said coil as said coil exits
10 from the trailing hole of said sheaf to be bound.

9. The binding machine as in Claim 8, wherein said conveyor comprises a horizontal coil conveyor for moving a succession of plastic spiral coils into position for mounting on said mandrel and spreading by contact with said leading-hole spreader members, said conveyor comprising a feed end and a mandrel end, said conveyor comprising an elongated horizontal chute horizontally disposed in alignment with said mandrel, said chute comprising a pair of opposing walls and a floor, said floor
20 having motive means for urging a succession of coils fed into said feed end of said chute in the direction of said mandrel end of said chute.

10. The binding machine as in claim 1 further comprising a
25 plurality of guide notches along a travel path of said spiral binding element, wherein each said coil is a guard through said

plurality of guide notches during a section of said coil into said holes.

11. A coil spreader system for a spiral bound book binding machine comprising a means for significantly spreading apart each coil of said spiral binding element for initial insertion into respective first and last holes of a row of holes, said means comprising two leading hole spreader members insertable within said respective coils of said spiral binding wherein at a point before the spiral enters the leading hole of a sheaf to be bound, said leading-hole spreader members being disposed adjacent to said leading hole and wherein another a trailing-hole spreader member is located adjacent to said final hole, wherein a predetermined space between each said coil is widened by contact of a binding edge of each said spreader member around each said coil.

12. The coil spreader system for a spiral bound book binding machine as in claim 11 having a comb clamp having a pair of opposing elongated jaws with alternating projections and recesses therebetween,

one of said jaws being a fixed jaw horizontally disposed along and attached to the longitudinal frame of said binding machine and the other of said jaws being a movable jaw hinged to said longitudinal frame of said binding machine so as to be movable between a closed position in close proximity to said

fixed jaw for clamping said sheaf in place with holes in alignment with said recesses in preparation for accepting said spiral coil; and wherein

5 said leading hole spreader members are oppositely disposed respectively on said opposing fixed and movable jaws of said comb clamp;

10 said spreader disposed on said fixed jaw comprising a flat base having a slot therein and a slim extension projecting therefrom, said slim extension having a contact end for contacting and spreading said coil, said contact end being rounded and tapered; and wherein

15 said spreader disposed on said movable jaw comprising a flat base having a slot and an aperture therein and an extension projecting therefrom, said extension having a guidance groove therein for accepting and guiding said spiral coil as said coil travels longitudinally during the process of entering and binding successive holes of said sheaf to be bound;

20 said extensions and for contacting and spreading said spiral coil at a point before the leading edge of said coil enters the leading hole of said sheaf to be bound;

 said extensions and being disposed adjacent to each other when said comb clamp is in its closed position; and wherein

25 said trailing hole spreader comprises a base having an oblique contour blade member extending therefrom, said oblique contour blade member engagable with said coil as said coil exits from the trailing hole of said sheaf to be bound.

13. A method of binding a sheaf of pages using a plastic spiral binder inserted by a binding machine into a succession of aligned holes in the pages of said sheaf, comprising the steps of:

5 a. compressing the leaves of a sheaf to be bound by moving a longitudinally disposed hinged comb jaw of a binding machine to its closed position in close registered proximity to a matching fixed comb jaw of a binding machine;

10 b. transporting a plastic spiral binder by using a horizontal conveyor to transport said plastic spiral binder to a mounting mandrel of a binding machine;

 c. urging said plastic spiral binder onto said mandrel;

20 d. spreading the coil of said spiral binder slightly by means of two spreaders respectively mounted in registry upon said hinged comb jaw and said matching fixed comb jaw of said binding machine, said spreaders being mounted on said comb jaws at a point in travel before the leading hole of said succession of holes in said sheaf to be bound; said spreader mounted on said hinged comb jaw having a guiding notch therein for engaging and guiding the plastic spiral binder into alignment for entry of the leading edge of said spiral binder into the leading hole of said sheaf; and

25 e. continuing to urge said plastic spiral binder in a winding motion so as to engage it with each successive hole of said sheaf; and, upon completing insertion of said spiral binder into all of said successive sheaf holes, and,

f. cutting said spiral binder to match the length of the sheaf that has been bound by insertion of said spiral binder into said holes.